

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (original): A communication apparatus having a plurality of communication elements that are electrically connected to an electrically conductive layer or an electromagnetic action transfer layer, characterized in that each of the communication elements has a communications capability of conveying a signal via the conductive layer or the electromagnetic action transfer layer to other neighboring communication elements.

2. (original): A communication apparatus having a plurality of distributed communication elements, characterized in that each of the communication elements has such a coverage that allows local communications with other neighboring communication elements, the local communications allowing sequential transmissions of a signal between the communication elements to convey the signal to a target communication element.

3. (currently amended): The communication apparatus according to claim 1 [[or 2]], wherein

no individual conductive wires are formed between the communication elements.

4. (currently amended): The communication apparatus according to ~~any one of~~
~~claims 1 to 3~~ claim 2, wherein

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~~the plurality of communication elements are classified into the first order to the Nth order ranks in ascending order of communication management capabilities of the no individual~~
conductive wires are formed between the communication elements.

5. (currently amended): The communication apparatus according to claim ~~[[4]]~~ 1,
wherein

the plurality of communication elements are classified into the first to Nth order ranks in ascending order of each rank function as the first order communication management element for conveying a signal to other communication elements that exist within a certain neighboring range therefrom, to realize local communications with the neighboring communication capabilities of the elements.

6. (currently amended): The communication apparatus according to claim ~~[[4 or 5]]~~ 2, wherein

the plurality of communication elements are classified into the first to Nth order ranks in ascending order of communication management capabilities of the elements. ~~the Mth-order communication elements have at least a function of the (M-1)th order communication elements, which is necessary for communications management, and~~

~~the Mth-order communication elements can be less densely populated than the (M-1)th order communication elements.~~

7. (currently amended): The communication apparatus according to ~~any one of~~
~~claims 4 to 6~~ claim 5, wherein

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the communication elements of each rank function as the first order communication element for conveying a signal to other communication elements that exist within a certain neighboring range therefrom, to realize local communications with the neighboring communication elements. ~~the Mth order communication element manages the (M-1)th order communication elements which are populated within a predetermined range therefrom.~~

8. (currently amended): The communication apparatus according to claim [[7]] 6, wherein

the communication elements of each rank function as the first order communication element for conveying a signal to other communication elements that exist within a certain neighboring range therefrom, to realize local communications with the neighboring communication elements. ~~the Mth order communication element stores a route to an (M-1)th order communication element that it manages, as a route by way of other (M-1)th order communication elements.~~

9. (currently amended): The communication apparatus according to ~~any one of~~ claims 4 to 8 claim 7, wherein

the Mth order communication elements have at least a function of the (M-1)th order communication elements, which is necessary for communication management, and

the Mth order communication elements can be less densely populated than the (M-1)th order communication elements. ~~element stores a route to another Mth order communication element that is placed within a predetermined range therefrom, as a route by way of an (M-1)th order communication element.~~

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10. (currently amended): The communication apparatus according to ~~any one of claims 4 to 9~~ claim 8, wherein

the Mth order communication elements have at least a function of the (M-1)th order communication elements, which is necessary for communication management, and

the Mth order communication elements can be less densely populated than the (M-1)th order communication elements. ~~element can serve as a communication element of each of the second to the Mth order ranks, and when functioning as a communication element of a given rank, the Mth order communication element manages a communication element, lower in rank by one, which is placed within a range set in the given rank.~~

11. (currently amended): ~~[[The]]~~ A communication apparatus device for transmitting a signal to other communication elements existing within a coverage, the device comprising first and second signal layers isolated from each other, and a communication element connected electrically to these layers, wherein the coverage is determined in accordance with the resistances of the first and second signal layers and the capacitance between the first and second signal layers, allowing the communication element to transmit a signal by discharging electric charges to the first and/or second signal layer. ~~according to any one of claims 4 to 10, wherein~~

~~the (M-1)th order communication element stores at least part of the route to the Mth order communication element that manages the (M-1)th order communication element, as a route by way of other (M-1)th order communication elements.~~

12. (currently amended): ~~[[The]]~~ A communication device for transmitting a signal to other communication elements existing within a coverage, the device comprising first and

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second signal layers, and a communication element connected electrically to these layers,
wherein the first signal layer and the second signal layer are brought into conduction in the
communication element, thereby allowing a signal to be transmitted. ~~apparatus according to any~~
~~one of claims 4 to 11, wherein~~

~~the second order communication element transmits a neighborhood response request, and~~
~~based on a response returned from the first order communication element that has received the~~
~~neighborhood response request, the second order communication element sets an ID to the first~~
~~order communication element that has returned the response.~~

13. (currently amended): The communication ~~apparatus~~ device according to claim
[[12]] 11, further comprising a high resistance layer which has a resistance higher than those of
the first and second signal layers and which brings these layers into conduction. , wherein

~~the second order communication element transmits a neighborhood check request to the~~
~~first order communication element to which an ID has been set, and the first order~~
~~communication element that has received the neighborhood check request transmits a~~
~~neighborhood response request to check for a neighboring first order communication element,~~
~~and the second order communication element sets an ID to the first order communication~~
~~element that has returned a response.~~

14. (currently amended): The communication ~~apparatus~~ device according to claim
[[13]] 12, further comprising a high resistance layer which has a resistance higher than those of
the first and second signal layers and which brings these layers into conduction. , wherein

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~~the second order communication element repeatedly transmits the neighborhood check request to set IDs to and manage an increased number of first order communication elements and successively set routes to the first order communication elements that it manages.~~

15. (currently amended): The communication ~~apparatus~~ device according to ~~any one~~ of claims 12 to 14 claim 11, further comprising a high resistance layer which has a resistance higher than that of the first signal layer and which is electrically connected to the first signal layer, and a power supply layer which is electrically connected to the high resistance layer and which supplies power to the communication element. ~~, wherein~~

~~the third or higher order communication elements serve also as a second order communication element to set an ID to a first order communication element.~~

16. (currently amended): The communication ~~apparatus~~ device according to ~~any one~~ of claims 4 to 15 claim 12, further comprising a high resistance layer which has a resistance higher than that of the first signal layer and which is electrically connected to the first signal layer, and a power supply layer which is electrically connected to the high resistance layer and which supplies power to the communication element. ~~, wherein~~

~~the third or higher order communication elements can serve as a communication element of each of the third to its own ranks, and transmits a relay neighborhood response request as a communication element of each rank to set a communication element lower in rank by one which is managed in each rank.~~

17. (currently amended): The communication ~~apparatus~~ device according to claim 16, wherein

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~~the coverage is determined in accordance with the resistance of the first signal layer, third or higher order communication elements set a route to a communication element that is under their management.~~

18. (currently amended): A method for circuit board implementation including film-type or sheet-type circuit board, comprising distributing a plurality of circuit elements on an electrically conductive circuit board, the circuit elements each of which has a communications capability of conveying a signal within each predetermined coverage, thereby mounting the circuit elements on the board without forming individual conductive wires between the circuit elements. The communication apparatus according to any one of claims 4 to 17, wherein a data signal packet includes route data in each rank which is utilized to reach the communication element at the final destination.

19. (currently amended): A tactile sensor comprising at least one sensor element including a circuit for measuring stress or temperature to convert it into a coded signal, and an electrically conductive flexible structure which conveys an output signal from the sensor element. The communication apparatus according to claim 18, wherein

~~the route data in the (M-1)th order rank includes data on a route to an Mth order communication element located halfway on the route from the transmitting source communication element to the communication element at the final destination.~~

20. (currently amended): The tactile sensor according to claim 19, wherein

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a plurality of signal terminals of the sensor elements are connected to an electrically continuous, electrically conductive rubber region of the sensor. ~~communication apparatus according to claim 18 or 19, wherein~~

~~the packet includes a receiving element ID for identifying the communication element that is subsequently to receive the packet.~~

21. (currently amended): The tactile sensor according to claim 19, wherein the sensor element is provided with two electrodes, which electrically contact two electrically conductive rubber sheets of the elastic structure. ~~communication apparatus according to any one of claims 18 to 20, wherein~~

~~upon reception of the packet based on the receiving element ID, the communication element sets a receiving element ID of the communication element that is subsequently to receive the packet, and then sends the packet.~~

22. (currently amended): The tactile sensor according to claim 19, wherein electrodes of the sensor element electrically contact two or more electrically conductive rubber sheets of the elastic structure by means of pin-shaped projections protruded from the sensor element. ~~communication apparatus according to claim 21, wherein~~

~~the communication element sets the receiving element ID in accordance with the route data included in the packet.~~

23. (currently amended): The tactile sensor according to claim 19, wherein the sensor element is provided on one surface with two or three electrodes, each of which electrically contacts a plurality of electrically conductive rubber regions formed in a single layer

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~~of the elastic structure. communication apparatus according to any one of claims 18 to 22,
wherein~~

~~upon reception of the packet based on the receiving element ID, each communication
element updates the route data and then transmits the packet.~~

24. (currently amended): The tactile sensor according to claim 19, wherein
neighborhood stress is detected in accordance with a variation in capacitance between an
LSI chip of the sensor element and an electrode component connected thereto. ~~communication
apparatus according to any one of claims 4 to 23, wherein~~

~~each communication element is assigned an ID, and a higher order communication
element refers to an ID included in the packet, thereby determining whether the communication
element that is identified by the ID is under its own management.~~

25. (currently amended): The tactile sensor according to claim 24, wherein
the electrode component connected to the sensor element is supported at a small area near
its center, thereby allowing the electrode to be deformed with a good sensitivity to an uneven
pressure on the surface of the electrode. A communication device for transmitting a signal to
other communication elements existing within a coverage, the device comprising first and
second signal layers isolated from each other, and a communication element connected
electrically to these layers, wherein the coverage is determined in accordance with the resistances
of the first and second signal layers and the capacitance between the first and second signal
layers, allowing the communication element to transmit a signal by discharging electric charges
to the first and/or second signal layer.

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26. (currently amended): The tactile sensor according to claim 19, wherein a neighborhood stress is detected by an LSI chip in accordance with a variation in resistance of a pressure-sensitive electrically conductive rubber sheet connected thereto. A communication device for transmitting a signal to other communication elements existing within a coverage, the device comprising first and second signal layers, and a communication element connected electrically to these layers, wherein the first signal layer and the second signal layer are brought into conduction in the communication element, thereby allowing a signal to be transmitted.

27. (currently amended): The tactile sensor according to claim 19, wherein a neighborhood stress is detected in accordance with a variation in the amount of light arriving at an optical sensor on an LSI chip of the sensor element. ~~communication device according to claim 25 or 26, further comprising a high resistance layer which has a resistance higher than those of the first and second signal layers and which brings these layers into conduction.~~

28. (currently amended): [[The]] A communication device which conveys a signal to other communication elements existing within a coverage, comprising first and second signal layers isolated from each other, and a communication element electro-magnetically connected to these layers, wherein the coverage is determined in accordance with an attenuation factor of an electromagnetic wave, and the communication element emits an electromagnetic wave or a beam of light into the layers including the first signal layer and the second signal layer, thereby transmitting a signal. ~~according to claim 25 or 26, further comprising a high resistance layer~~

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~~which has a resistance higher than that of the first signal layer and which is electrically connected to the first signal layer, and a power supply layer which is electrically connected to the high resistance layer and which supplies power to the communication element.~~

Cancel claims 29-44 without prejudice or disclaimer.